

10/566604

IAPS Rec'd PCT/US 31 JAN 2006

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hidenori MORIYA et al.

Attn: PCT Branch

Application No. New U.S. National Stage of PCT/JP2004/010077

Filed: January 31, 2006

Docket No.: 126838

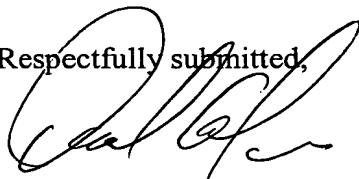
For: CONTROL DEVICE FOR INTERNAL COMBUSTION ENGINE AND METHOD
FOR DETERMINING MISFIRE IN INTERNAL COMBUSTION ENGINE

TRANSLATION OF THE ANNEXES TO THE
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is a translation of the annexes to the International Preliminary Report on Patentability (Form PCT/IPEA/409). The attached translated material replaces the claims in their entirety.

Respectfully submitted,


James A. Oliff
Registration No. 27,075

Daniel A. Tanner, III
Registration No. 54,734

JAO:DAT/nxy

Date: January 31, 2006

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE
AUTHORIZATION
Please grant any extension
necessary for entry;
Charge any fee due to our
Deposit Account No. 15-0461

AMENDED PAGES

CLAIMS

5 1. (After amendment) A control device for an internal combustion engine that generates power by burning an air-fuel mixture in a cylinder, comprising:
 in-cylinder pressure detecting means;
 calculating means that calculates a control
10 parameter based on an in-cylinder pressure detected by the in-cylinder pressure detecting means and an in-cylinder volume at the time of detecting the in-cylinder pressure; and
 misfire determining means that determines a misfire condition in the cylinder based upon the control parameter calculated by the calculating means, wherein:
 the control parameter is a product of the in-cylinder pressure detected by the in-cylinder pressure
20 detecting means and a value obtained by exponentiating the in-cylinder volume at the time of detecting the in-cylinder pressure by a predetermined index number;
 the calculating means calculates the control parameters in two predetermined points; and
25 the misfire determining means determines that an inside of the cylinder is in a misfire condition by comparing a difference component in the control

parameters between the two predetermined points with a predetermined threshold value.

2. (After amendment) The control device for the
5 internal combustion engine according to claim 1,
wherein:

the misfire determining means determines that the inside of the cylinder is in a half-misfire condition when the difference component in the control
10 parameters between the two predetermined points is below a first threshold value.

3. (After amendment) The control device for the internal combustion engine according to claim 2,
15 wherein:

when the misfire determining means determines that the inside of the cylinder is in the half-misfire condition, at least one of a throttle opening, a fuel injection quantity, an opened/closed timing of an
20 intake valve or an exhaust valve, and an exhaust gas recirculating rate is corrected in such a way as to restrain a subsequent misfire.

4. (After amendment) The control device for the
25 internal combustion engine according to claim 3,
wherein:

the misfire determining means that the inside of

the cylinder is in a complete-misfire condition in a case where after the correction is made for a predetermined time, the difference component in the control parameters between the two predetermined 5 points is below the first threshold value and also below a second threshold value, which is smaller than the first threshold value.

5. (After amendment) The control device for the
10 internal combustion engine according to claim 1,
wherein:

one of the two predetermined points is set at a point after an intake valve opens and also before combustion starts, and the other is set at a point 15 after the combustion starts and also before an exhaust valve opens.

6. (After amendment) A method for determining a misfire in an internal combustion engine that
20 generates power by burning an air-fuel mixture in a cylinder comprising:

- (a) a step of detecting an in-cylinder pressure;
- (b) a step of calculating a control parameter based on the in-cylinder pressure detected in the step
25 (a) and an in-cylinder volume at the time of detecting the in-cylinder pressure; and
- (c) a step of determining a misfire condition in

the cylinder based on the control parameter calculated in the step (b), wherein:

the control parameter to be calculated in the step (b) is a product of the in-cylinder pressure detected in the step (a) and a value obtained by exponentiating the in-cylinder volume at the time of detecting the in-cylinder pressure by a predetermined index number,

in the step (b), the control parameters are calculated in two predetermined points; and

in the step (c), it is determined that an inside of the cylinder is in a misfire condition by comparing a difference component in the control parameters between the two predetermined points with a predetermined threshold value.

7. (After amendment) The method for determining the misfire in the internal combustion engine according to claim 6, wherein:

in the step (c), it is determined that the inside of the cylinder is in a half-misfire condition when the difference component in the control parameters between the two predetermined points is below a first threshold value.

25

8. (After amendment) The method for determining the misfire for the internal combustion engine

according to claim 7, further comprising:

(d) a step of correcting at least one of a throttle opening, a fuel injection quantity, an opened/closed timing of an intake valve or an exhaust 5 valve, and an exhaust gas recirculating rate in such a way as to restrain a subsequent misfire when it is determined in the step (c) that the inside of the cylinder is in the half-misfire condition.

10 9. (After amendment) The method for determining the misfire for the internal combustion engine according to claim 8, further comprising:

(e) a step of determining that the inside of the cylinder is in a complete-misfire condition in a case 15 where after the correction in the step (d) is made for a predetermined time, the difference component in the control parameters between the two predetermined points is below the first threshold value and also below a second threshold value, which is smaller than 20 the first threshold value.

10. (After amendment) The method for determining the misfire for the internal combustion engine according to claim 6, wherein:

25 one of the two predetermined points is set at a point after an intake valve opens and also before combustion starts, and the other is set at a point

after the combustion starts and also before an exhaust valve opens.

11. (Deletion)
- 5 12. (Deletion)
13. (Deletion)
14. (Deletion)